



Hydro Resources ECCV D1-2 Injection Log Interpretation – Report 1



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Flowmeter Interpretation

Hydro Resources
ECCV D1-2
August 29, 2016

Casing Description	Size (in)	Casing Weight (lb/ft)	Depth Interval (ft)
Surface	10 3/4	40.5	Surface – 1,757
Intermediate	7 5/8	26.4	Surface – 9,051
Liner	4 1/2	11.6	9,051 – 10,098

Objective

Determine the current injection profile over the Wolfcamp (9,508 – 9,594 ft), Amazon (9,594 – 9,640 ft) and Council Grove (9,666 – 9,740) formations.

Logging Program

Using the Lee Specialty PLT tool string, log 3 UP and DOWN at 90, 120, and 150 ft/min. Depths logged were 9,485 to 9,745 ft KB. Surface injection rate was estimated to be 14,400 BPB (10 BPM) from previous measurements. All passes were depth corrected to Reliance OFS Temperature Gamma Ray Casing Collar Log, dated: August 9, 2016.

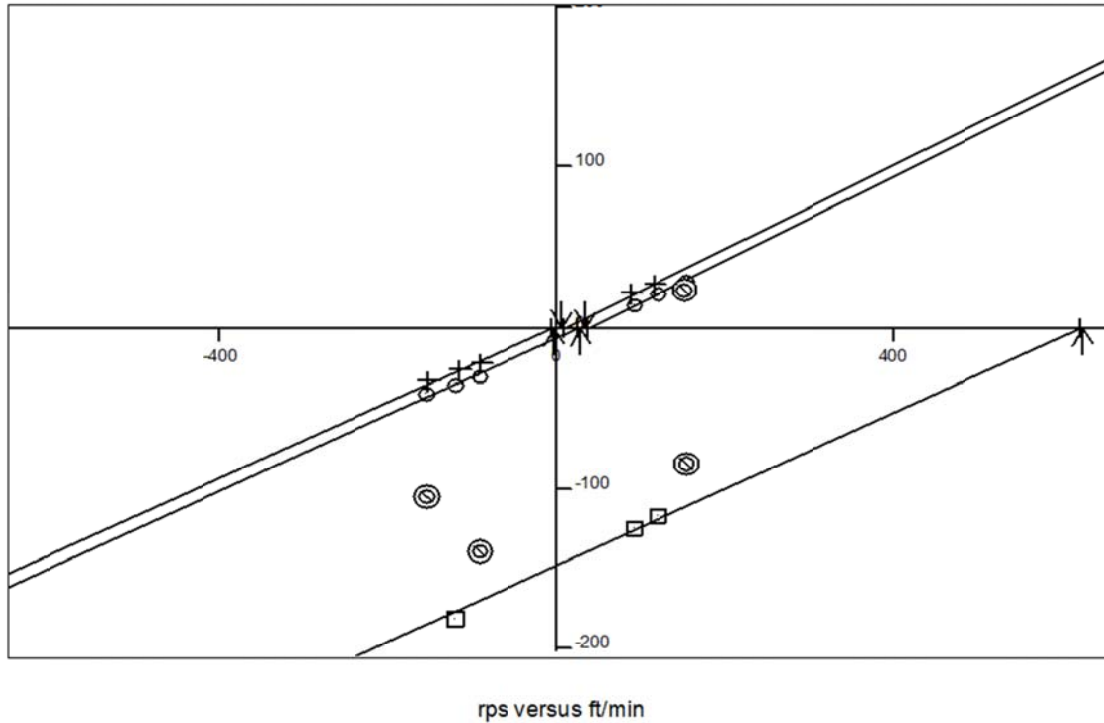
Interpretation Summary

Injection data was used to obtain in-situ calibrations for the flowmeter, and then applied to the injection data to calculate VAPP and subsequent injection rates. The calibration data is shown below. (Figure 1)

The interpretation indicates a total of 10,987 BPD injection at bottom hole conditions above the Wolfcamp/Amazon/Council Grove vs. a reported 14,400 BPD surface injection. All UP and DOWN spinner passes recorded good data with the exception of the DOWN 90 and UP 150 passes. The UP 90 and UP 120 were used primarily for the analysis.

The interpretation indicates injection percentages over the three formations of interest.

Figure 1. Spinner Calibration



Threshold (+) 3.3 ft/min

Threshold (-) -3.3 ft/min

	Calib. Zone ft	Slope (+)	Slope (-)	Int (+) ft/min	Int (-) ft/min	Int. Diff. ft/min
□	9400.0-9450.0	N/A	0.237	N/A	623.37	0.00
○	9752.0-9771.0	0.260	0.237	36.77	26.49	10.28
+	10020.0-10025.0	0.260	0.237	9.63	-6.49	16.13

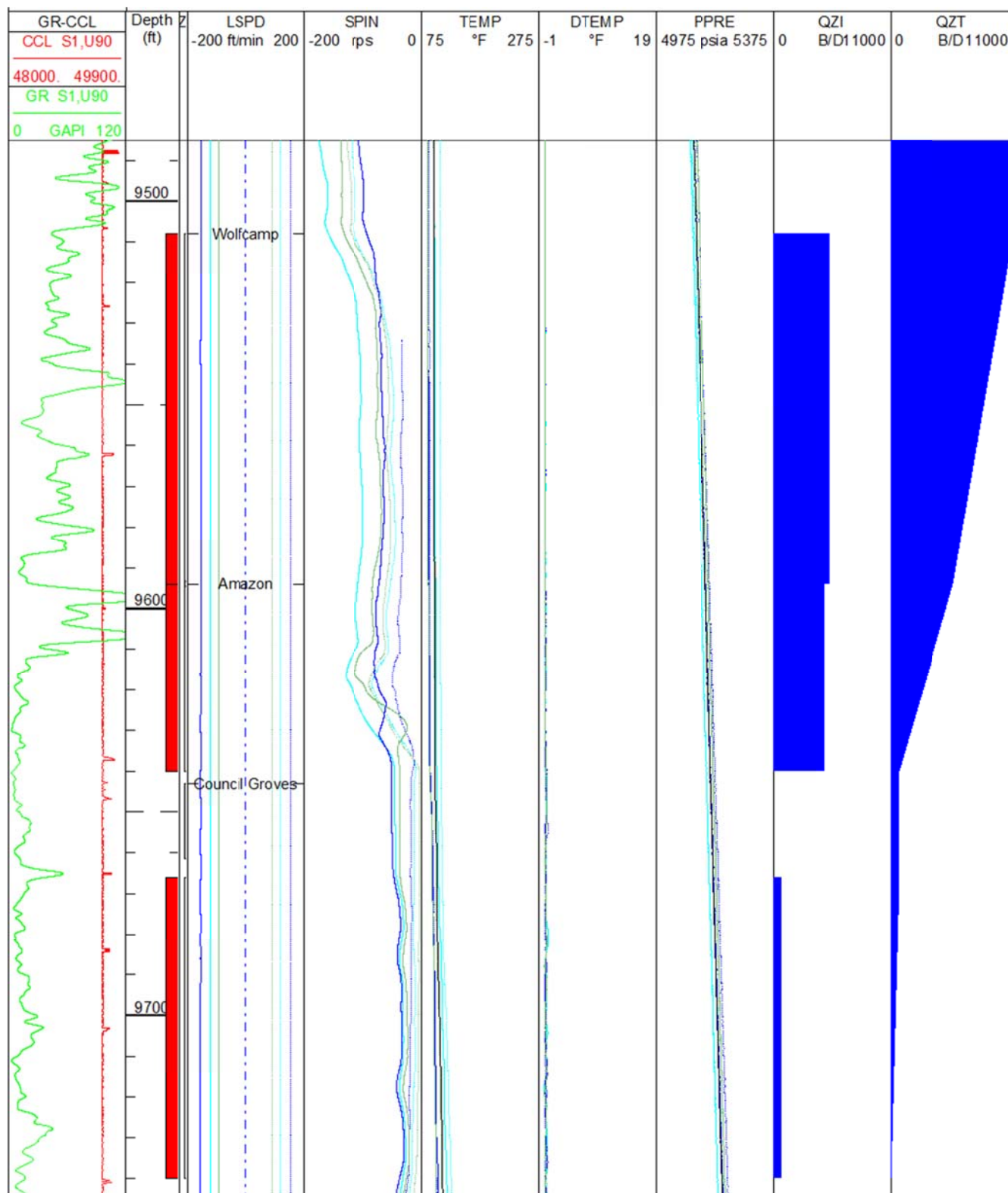
Figure 2. Zone Contributions; Reservoir Conditions

Zones ft	Qt res. B/D	Production %	W O G
Wolfcamp (9508.0-9594.0)	-5405.11	49.18	
Amazon (9594.0-9640.0)	-4880.96	44.42	
Council Grove (9666.0-9740.0)	-703.36	6.40	

Zone ft	Corr. factor	Vm ft/min	Q downhole B/D	Contrib. %	Q @ s.c. STB/D
Wolfcamp (9508.0-9594.0)	0.92	490.92	-10987.50	49.18	11080.50
Amazon (9594.0-9640.0)	0.91	249.49	-5583.98	44.42	5629.68
Council Grove (9666.0-9740.0)	0.89	31.43	-703.37	6.40	708.77

Zone ft	ID in	Deviation °	T °F	P psia	FVF	Viscosity cp
Wolfcamp (9508.0-9594.0)	4.000	0.00	93.74	5059.340	0.99	0.8100
Amazon (9594.0-9640.0)	4.000	0.00	95.94	5142.620	0.99	0.7900
Council Grove (9666.0-9740.0)	4.000	0.00	98.48	5164.830	0.99	0.7700

Figure 3. Injection Profile Log



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